Supplementary Data4 Rating Control (#21957)

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1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
We examine a dissociation between conscious and non-conscious processing in human adults. Adults performance in this experiment will be compared to performance of non-human animals (e.g., dogs and monkeys) and human Children in other experiments. We predict that human adults will show conscious and non-conscious dissociations in their performance. Specifically, we predict that when participants are aware of the cue location, they will mostly be able to use the incongruent cue to become above chance and have a positive learning slope, while when participants are unaware of the incongruent cue location, they will likely choose its location more often and mostly be below chance. We predict that most participants will show the predicted opposite performance dissociation. Yet since in this control condition we will let participants know in advance that cues will be flashing and that they will be incongruent with the reward location, we may find large differences between different participants performance, based on individual differences in subliminal thresholds. Such that some participants may clearly see most cues and will do really well, while others may fail to see at the low intervals do really poorly. differences in size of this dissociation may exist in the different intervals used, such that for instance we anticipate that participants will do well in 100ms than the other shorter intervals. We predict a dissociation in performance for trials rated 0 as not seen, (and possibly also trials rated as 1) that will likely result in slightly below chance performance, while trials that were seen (rated 2-3) will result in above chance performance. This result will indicate that awareness, rather than cue interval, is the critical factor for the observed results. While we predict that accuracies of trials rated as 2-3 will be high, we anticipate that trials rated 1 and 0 might be more difficult to interpret. 0 for some participants may also include trials that were unattended and escaped non-conscious processing too. 1 rating for some participants may include trials that are non-conscious, while for others the same rating may mean trials that the participants are more aware of. Because participants are instructed from the beginning that the reward will be opposite of the cue, we will put more weight to the forced guess of the participant, than to its certainty of seeing the cue rating. Such that if participants believe they saw the cue in one location, they should press the opposite side no matter how sure they are. From these reasons, we will analyze 0 and 1 ratings once separately and once also together as a group.

3) Describe the key dependent variable(s) specifying how they will be measured.
The dependent variable will be choice accuracy. Participants will be presented with two treasure chests on the left/right sides of the screen, and only one of which has a hidden reward. Participants must guess which side has the reward, and the percent of correct responses will be measured. In addition, we will also estimate the slopes of learning in choice accuracy. We anticipate that in trials where participants report they saw the cue (2-3 rating), the slop will be positive. Participants will be gaged after each trial for a scale of how sure they are that they saw the cue from 0 to 3. This scale will be used to categorize trials as unaware (rating of 0, and possibly also 1) vs. aware (ratings 2-3).

4) How many and which conditions will participants be assigned to?
Participants will perform in 5 blocks of 40 trials each with 17ms cues; and then 5 blocks of 40 trials with the intervals 17, 33, 50, and 100 milliseconds randomly intermixed. Participants will be gaged after each trial for a scale of how sure they are that they saw the cue from 0 to 3. This scale will be used to categorize trials as unaware (rating of 0 and possibly also 1) vs. aware (ratings 2-3).
Before every block participants will also be exposed to 10 trials of a conscious non-masked congruent stars in attempt to keep the congruent response towards the star more dominant.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
(a) We will analyze performance accuracy deviation from chance (50%) using a one sample t-test as well as a test of the intercept in mixed models (a mixed logistic model with a random intercept for each participant). In addition in mixed models we will also test the possible effects of gender, and trial order, though we consider these tests exploratory. This will be performed separately in each condition.
(b) we will also perform categorical tests of participant scores. Specifically, we will compare the ratio of participants with higher than 50% accuracy and below between aware and not-aware conditions compared to expected with a chi square test.
(c) Results allowing, we will perform the proportion comparisons above separately for the aware unaware conditions.
For a higher resolution of participant scores, we will compare expected participant distribution of performance scores in the two extreme quadrants expected to include about ~25% of participants as predicted by a binomial distribution of participants performing at random 50%. For example, with 385 trials 24% of participants are expected to obtain an accuracy score at or below 48% by chance (or at or above 52%). We will test if a higher proportion of participants then expected in the unaware trials score at or below 48%, and if a higher proportion of participants in the conscious condition score at or

above 52%.
(d) Results allowing, we will perform a higher confidence analysis and compare the expected proportion of participants scoring in the most extreme <10% of a random distribution, with scores considered to be significant or marginally significant at the individual participant level. For example, with 385 trials scores at or below 46% are very rare and are expected to emerge by chance in only <10% of participants. We will test if higher proportion of participants in the unaware score as extreme, or the equivalent >54% in the aware trials. Note that in these analysis that actual "critical percentage" to compare to will be calculated separately for each participant based on the number of trials included in the analysis with the same category rating.
(e) Because participants are instructed in the beginning to choose opposite of the cue, and because participants will practice this strategy over time, we anticipate that the automatic dominant response may switch to become the opposite of the cue response after some training. As a result we will also analyze the first block(s) separately, that may likely be less affected by this continuous training.
(f) We will also test accuracies as a function of cue interval together with cue awareness ratings, anticipating that longer intervals (particularly 100ms) will be easier, but also collapsed as a group of all intervals separated only by cue ratings.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
(a) Participants will be excluded if they fail to perform at or above 65% in the 100ms interval (which we consider participants should be aware of if they are attentive to the task), providing this cutoff will not exclude more than 10% of participants. if this cutoff will include more than 10% of participants, we will sort participants based on their accuracies in this interval and exclude 10% with the lowest scores.
(b) participants who don't rate the 100ms interval as more visible than the other intervals will be excluded (which we consider participants should be aware of if they are attentive to the task),providing that this cutoff will not exclude more than 10% of participants. if this cutoff will include more than 10% of participants, we will sort participants based on their ratings in this interval and exclude 10% of participants with the lowest ratings.

(d) we consider a minimum of 20 trials to be needed to make a meaningful analysis to compare performance in the aware or not aware conditions. If participants have fewer than 20 trials in ratings 0-1 or fewer than 20 trials in ratings 2-3 they will be excluded, providing this cutoff will not exclude more than 10% of participants. if this cutoff will include more than 10% of participants, we will sort participants based on their number of trials in the aware and un-aware ratings and exclude 10% with the fewest trials in one of the conditions.
(e) we will consider participants with reaction times faster than 3 standard deviations from other participants in the task as possibly not actively engaging in the task and its instructions and thus will be excluded.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We are willing to test up to 40 participants. However, because this might represent an unnecessarily expenditure of resources, we will use a sequential testing design1 . Thus, we will test a minimum of 20 participants. Once this minimum number of participants has been obtained we will test for our effect using a p-value corrected for sequential testing in 3 time points calculated via the GroupSeq package in R based with Hwang-Shih-DeCani family correction with a phi of 1; for example, if we test the minimum of 20 participants at the first time point this will require $p < .0311$ to confirm our hypothesis and stop testing. If we do not reach this alpha we can continue for time point t2 with 75% of our maximum participants -- 30 participants with the specified corrected alpha of t2 <.0229. or finally if required we will test at the last time point t3 with our maximum set number of participants - 40 with a corrected alpha of $p < .0218$.

1. Lakens D (2014) Performing high-powered studies efficiently with sequential analyses. European Journal of Social Psychology 44, 701–710. DOI: 10.1002/ejsp.2023

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Nothing else to pre-register.